

September 5, 2017

LOS ANGELES FIRE DEPARTMENT



RALPH M. TERRAZAS
FIRE CHIEF

August 23, 2017

BOARD OF FIRE COMMISSIONERS
FILE NO. 17-104

TO: Board of Fire Commissioners

FROM:  Ralph M. Terrazas, Fire Chief

SUBJECT: LOS ANGELES FIRE DEPARTMENT UNMANNED AERIAL SYSTEMS
POLICY: FOR DEPLOYMENT AND USE

FINAL ACTION:	<input type="checkbox"/> Approved	<input type="checkbox"/> Approved w/Corrections	<input type="checkbox"/> Withdrawn
	<input type="checkbox"/> Denied	<input type="checkbox"/> Received & Filed	<input type="checkbox"/> Other

SUMMARY

The Los Angeles Fire Department (LAFD) has studied the potential of acquiring federal authorization to utilize drones, or unmanned aerial systems (UAS), and potential departmental policies for such usage. The LAFD has worked with the City Attorney and the American Civil Liberties Union (ACLU), under the recommendation of the Board of Fire Commissioners, to finalize the attached Los Angeles Fire Department UAS Policy: For Deployment and Use.

RECOMMENDATION

That the Board:

Approve and transmit to City Council (reference C.F.: 16-0410) the attached Department policy that provides and adheres to the guidelines for the safe and effective operation of an Unmanned Aircraft System (UAS).

CONCLUSION

This is a significant undertaking for the Department but one that is in direct alignment with the strategic plan. Capitalizing on advanced technologies via UAS will greatly improve our tactical effectiveness and provide for a more efficient deployment of resources in both the emergent and expanded incident management scenarios.

Fire Departments continues to strive for the tools that provide our fire service professionals greater awareness and access to critical information allows for safer and more effective action. It is our obligation to do everything possible to protect and defend the safety and lives of the citizens of Los Angeles.

Board report prepared by Richard Fields, Battalion Chief, Battalion 13.

Attachment



LOS ANGELES FIRE DEPARTMENT UAS POLICY

FOR DEPLOYMENT AND USE



Table of Contents

I.	Introduction.....	2
II.	Purpose	3
III.	Safety Policy.....	8
IV.	Security Policy	10
V.	Program Oversight	12
VI.	Appendix.....	13

Introduction

For the purpose of this document, the terms "Unmanned Aerial Systems (UAS)," and "Unmanned Aerial Vehicle" (UAV), will be interchangeable. (Unmanned Aerial "system" in order to encompass the entirety of the vehicle that flies, the ground-based controller, and the communications connection that connects the two.) Many sources have variations in terminology when referencing the depiction of this technology.

Vision

The basic assumption is that a UAV provides an efficient and effective way for gathering information for the Los Angeles Fire Department ("Department"). The UAV allows for a clearer understanding of an event and assists in getting the right resources in place. It allows the incident commander and hazard assessment teams to get a true visual of the incidents challenges that can be communicated to local, state, and federal officials. This puts everyone on the same page of understanding.

The enhancement of situational awareness provides structure and details for hazard mitigation during the incident and sets the foundation for incident stabilization and post incident recovery.

More importantly, this increased situational awareness positively impacts firefighter safety during wildland firefighting, technical rescues, search operations and hazardous materials incidents.

During these incident types the UAS can safely and effectively be put into hazardous environments or areas that could potentially jeopardize firefighter safety. The situational awareness gained by immediate, 360 degree, visual feedback from both eye level and overhead cannot be matched by firefighters on the ground or by helicopters. The UAS is a beneficial instrument that improves the likelihood of successful emergency management operations, while also delegating risk of response operations to unmanned systems.

The value of this program will also be seen in the deployment of the Unmanned Aerial System during the initial stabilization phase of an incident, primarily in areas where it is dangerous or ineffective to place people for the purpose of gaining a clear understanding of the scope of the incident. The technology would also be beneficial during the recovery phase for the disaster assessment process.

The benefits of adding visual capabilities to the information-gathering process cannot be overstated. This technology expands the scope of disaster assessments by enabling incident commanders a better understanding of the complexities associated with an incident and to collect and disseminate information at a faster rate. This would improve the decision-making process for both the strategic and tactical objectives. Visual images sent back from the UAV to the incident command post, Department Operations Center (DOC) or Emergency Operations Center (EOC) will aid in speeding up the recovery process.

Timely and accurate communication is essential in getting the right resources in place to mitigate an incident. Having the capability of observation enhances situational awareness. It gives various agencies a collective viewpoint of the disastrous event and strengthens the assessment process by capturing community vulnerabilities. Visual communication narrows the interpretation on what is reported at the incident and provides visual perspective as to the extent of damage.

Traditionally, contingency plans relied upon during the onset of a disaster came in the preparation phase.

Purpose

Of the nearly 470,000 calls for service the Department responds to annually, approximately 99% would not necessitate use of a specialized resource, such as a UAV. The vast majority of Department responses - 85% - are emergency medical services calls. These high frequency, low-risk call types often take place in a private residence and neither require the establishment nor development of the Incident Command System (ICS). There is not likely a scenario under which a Department UAS would be requested to deploy in these circumstances.

Fourteen percent of Department responses - usually structure fires - pose some risk to the public, property and firefighters, requiring the establishment and development of the ICS. In most cases, responding resources are able to handle the incident without the need for any specialized resources, including any use of a UAS.

That leads to about 1% of Department calls each year that could necessitate the use of a UAS. Such significant incidents pose a great challenge to Department members, resources and pose a considerable safety threat to all involved, including the affected community. By their nature, these low-frequency, high-risk incidents require every available means of gathering information to increase firefighter safety and increase situational awareness. Emergencies where the complexity or scope of the incident require critical decision making on the part of the incident commander and or pose a significant risk to firefighter safety could require the use of a Department UAS.

Those calls would include, but are not limited to: Hazardous materials incidents, confined space rescues, high/ low angle rescues, swift or moving water rescues or any other expanded or extended incident. A process for requesting a UAS follows in this document.

Objectives

To clearly define the conditions and parameters under which the Department will operate and deploy a UAS within the City limits and mutual aid communities as a supplement to pre-planning, training, incident assessment, and incident command operations. The primary role of the UAS is insertion into emergent or ongoing events that pose a risk to public safety or threats to the City's infrastructure by providing "real time" hazard assessment utilizing High Resolution (zoom capable) cameras, Infrared/Thermal Sensors, Night Vision Image sensors and Gas/Chemical Sensors (Sniffers).

As stated, these deployments will not be part of the typical Department response. Information garnered from a Department UAS will be used for informational and/or training purposes.

Mission Specific Deployment

As an all risk response agency, the Department responds to all calls for help. Although not meant to be “all inclusive” or exclusive of any emergent incident type, the following are primary scenarios under which the Department UAS can be requested, deployed and utilized:

Structure Fires – Deployment of UAS’s to structure fires, in particular, buildings suspected of structural compromise; i.e. roof, walls or floors related to and during the initial action phase and final mitigation of an incident.

Hiker (Hi/Low Angle Rescue) Incidents – Deployment of UAS’s in wilderness areas to (1). Verify the existence and location of lost or injured persons who have called 911 for assistance while in hiking, camping or climbing. (2). Confirm the safest and most effective means of dispatching Department rescue team members to make contact with such persons.

Swift Water Incidents – Deployment of UAS’s to City waterways, large bodies of water or during precipitous weather events (heavy rains) for the purpose of verifying the existence of and identifying the location of trapped or injured persons in swiftly moving water (at least 3 miles per hour and depths greater than 6 inches).

Extended/Expanded Incidents – Deployment of UAS’s to incidents lasting more than 12 hours in duration, where an Department Field Incident Management Team (F.I.M.T.) assumes command of an incident in place of the original Incident Commander.

Wildfire Mitigation – Deployment of UAS’s In Local, State and Federal areas for the purpose of GPS topographic mapping, planning and implementing control objectives. For developing hazard mitigation strategies; i.e., structure defense, perimeter control (hot spots) and containment assessment. **Under NO circumstances will a UAS be operated while manned aircraft are in operation.**

Natural Disaster Response and Assessment – Deployment of UAS’s to accelerate situational awareness necessary to begin the recovery process. To collect and disseminate information through visual images sent back to the incident command post, DOC or EOC for various agencies to have a collective viewpoint of a disastrous event and strengthens the assessment process by capturing community vulnerabilities.

Hazardous Material Mitigation – Deployment of UAS’s with dual-purpose sensor payload, high resolution camera to identify containment areas and amount of content for liquid spills or Gas/Chemical Sensors (Sniffers) to collect air/environment samples for analysis and identification.

Wide Area Search and Rescue – utilizing Infrared (IR) sensors to locate a lost person in low light tracking and deploying resources in areas where radio or cellular communication is impacted, diminished or unavailable.

Structure Collapse/Confined Space Search and Rescue – Deployment of UAS’s utilizing IR sensors to provide night-vision footage to track heat signatures of bodies, pinpointing the locations of survivors, and providing hazard assessment for rescuers access and egress.

Planned Training Events – Use of UASs for training exercises intended to simulate any of the above mentioned “real” scenarios. Use of UASs for training purposes shall be limited to events that take place on Department property, such as Drill towers 40, 81 or 89, Frank Hotchkin Memorial Training Center, live fire training, Jensen Filtration Plant, or local fire stations.

The Department's primary intention for integrating UAS technology into its initial action hazard mitigation and response matrix is to increase the incident commanders "situational awareness" to fully understand the challenges of a given incident in "real time" thereby providing critical information necessary to guide decision-making. Ultimately, those decisions impact the amount of risk the incident commander is willing to assume with firefighters lives.

Deployment Guidelines

Policy:

It shall be the policy of the Department to provide and strictly adhere to the guidelines for the safe and effective operation of an Unmanned Aircraft System (UAS).

Objective:

To clearly define the conditions and parameters under which the Department will operate and deploy a UAS within the City limits and mutual aid communities as a supplement to pre-planning, training, incident hazard assessment, and incident command operations. The development of this policy and procedures incorporates Department Air Operations knowledge of FAA regulations, to include concepts of Operational Risk Management (ORM), Crew Resource Management (CRM), Aviation Training Operations Procedures Standardization (ATOPS) and stakeholders.

Flight Procedures

The UAS is an operational tool to be used by certain authorized Department personnel in response to "all hazard" scenarios, which include: active structure fires; post-extinguishment phases of a structure fire; brush (wild land) fires and natural disaster damage assessment; hazardous material identifications; and confined area search operations, such as "river rescue" and "hiker" incidents. The UAS is also intended to be used for training exercises, such as operational pre-planning training (drills) and related video production.

The Department's UAS **will not** be used to monitor members of the public or provide surveillance for law enforcement purposes. Its intended use is to provide greater situational awareness to incident commanders thereby enhancing firefighter safety in response to and mitigation of emergent situations and incident types unrelated to citizen monitoring or surveillance.

1. The Department UAS will only be operated by trained, certified and (FAA part 107 or higher) licensed members (operators and observer) of the Department.
2. The UAS will be used for Department- related purposes only. The Department might, as part of California regional partnerships, Mutual Aid or Automatic Aid agreements, operate the UAS outside of "city" boundaries when dispatched to assist another regional Fire Department.
3. The UAS will **NOT** be lent to any other department or agency. However, if dispatched or properly requested, the UAS, operated by an Department UAS team member(s), can be utilized in accordance with the provisions of the COA and the Department UAS Policy.
4. For Department UAS flights, including pilot or observer certification and training or In-Service Training production, the "pilot in charge" SHALL request an incident number through Metro Fire Communications.
5. For Department UAS flights during live incidents, the "pilot in charge" SHALL ensure or request the UAS be added to the existing Incident. In all cases, incident information SHALL include: launch time, exact location, pilot in charge, mission type and UAS ID.

Upon request of the Department Incident Commander or Department Representative, when the Department is an assisting agency, the UAS flight team (operator and an observer) will deploy to the designated location within the Department fire protection area, as well as its surrounding Automatic Aid, Mutual Aid, Mutual Threat Zones and regional response areas. The UAS flight team will conduct a pre-flight assessment of the incident environment to ensure the proposed operation is within COA guidelines and Department UAS Policy.

The UAS Operator along with UAS Observer will determine if safe operation of the UAS can be accomplished as requested. The decision will be contingent upon several factors to include physical features of the area, obstructions to flight, terrain, and the weather. **The UAS Operator will make the final determination if flight operations can be initiated.**

The Incident Commander and/or UAS Operator will coordinate with the Department's Air Operations Section Commander or Chief Pilot for final clearance for **ALL** UAS flight operations.

UAS Teams

UAS Teams are an operator (pilot) and observer. The "team" concept is established to train for and respond to each authorized UAS mission. (Fire Ground Over-watch, Search and Rescue, Swift Water Rescue, etc.)

Each UAS Team will operate with at least two members of the Department (pilot-in-command and observer). Each member will be assigned a specific role prior to flight. Additional team members may be needed for complex missions, including Liaison and auxiliary Remote Controller (for independent gimbal/sensor control) The UAS Team will always have a least one certified pilot; this can be comprised of (2) Pilots or (1) Pilot and (1) Observer.

UAS Pilot

The Department UAS will only be operated by Department personnel trained in its safe and effective operation. These members will normally be trained and licensed field personnel for emergent incidents or trained and licensed members assigned to the In-Service Training Section for flights not related to an emergency response.

UAS operators must be Department personnel and must have at minimum, an FAA part 107 license and a minimum of **two** hours of knowledge based training and a minimum of **four** hours of skills. This generally includes simulator flights, a knowledge test of Federal Aviation Regulations, safety, maintenance, a proficiency test on the UAS, training conducted by a designated Department UAS instructor and **ten** hours of supervised in-flight operation.

UAS operators must maintain his/her part 107 license, maintain flight logs and all necessary records to meet the FAA's requirements. UAS operators will also be required to open, complete and maintain a task book specific to specialized flight operations; i.e. HazMat, Urban Search and Rescue or confined space flight prior to operating any DEPARTMENT UAS in that area. Additional regularly scheduled training/proficiency tests, as determined by the UASU Captain, must be completed and documented.

The UAS Operator will also be the team leader. The Operator will be ultimately responsible for the operation and solely responsible for input of commands of the UAS during flight. The Operator will also be responsible for UAS assembly, flight preparation, post flight procedures, UAS disassembly/storage procedures and documenting all UAS flights.

UAS Observer

The UAS Flight Observer will maintain a visual observation of the UAS while in flight and alert the PIC of any conditions (obstructions, terrain, structures, air traffic, weather, etc.), which may affect the safety of a flight. UAS Flight Observers will also ensure that the Operator is not interrupted during flight.

The Flight Observer's added function is to coordinate and communicate operations between the Pilot-in-Command (PIC) and ground personnel.

Additionally, the Flight Observer will be responsible for all aviation related communications required by Federal Aviation Regulations (FARs).

To accomplish this, the observer should be in close proximity and have constant communication with the PIC to ensure instant relaying of information.

UAS Data Technician

The UAS Data Technician will be utilized anytime the documentation captured by the UAS needs to be processed and transmitted in "real time" or in the initial action phase of an incident.

Safety Policy

Commitment to Safety

The Department is committed to having a safe and healthy aeronautical workplace, including:

- An ongoing pursuit of an accident free workplace, including no harm to people, equipment, the environment or property.
- A culture of open reporting of all safety hazards in which management will not initiate disciplinary action against any personnel who, in good faith, disclose a hazard or safety occurrence due to unintentional or intentional conduct.
- Support for safety training and awareness programs.
- Conducting regular audits of safety policies, procedures, and practices.
- Monitoring the UAS community to ensure best safety practices are incorporated into the organization.

It is the duty of every Department member with UAS responsibilities to contribute to the goal of continued safe operations. This contribution may come in many forms and includes always operating in the safest manner and avoiding unnecessary risks. Any safety hazards, whether procedural, operational, or maintenance related should be identified as soon as possible. Any suggestions in the interest of safety should be made to the UASU Captain or Team Leader without reservation.

If any member of Department UAS Flight Team observes or has knowledge of an unsafe or dangerous act committed by another member, the incident commander and the DEPARTMENT UAS shall be notified immediately so that corrective action may be taken.

Ground Safety

- The pilot and flight observer must always be aware of dangers to ground personnel from moving rotors.
- The pilot shall under no circumstances leave any unauthorized person in charge of the UAS controls while the UAS is running.
- If it is necessary for the pilot to leave the controls of the UAS, the engine will be shut down, battery removed, and the controls deactivated.
- Only mission essential personnel will be in proximity to UAS launch and recovery activities. When operating over populated areas, the pilot will ensure that a "defined incident perimeter" exists to limit the potential of persons being present beneath the UAS flight path.

Night Flight Operations

- To assist the pilot, a secondary (auxiliary) Video Camera Remote Controller with a video monitor screen should be deployed for independent gimbal/sensor control.

- UAS team members should obtain the minimum altitude necessary to avoid obstructions in the operating area prior to nightfall if possible.
- Due to field of view and distortion issues, night vision goggles may not be used as the primary means for visual observation duties. Such devices are ONLY permitted for augmentation of the Flight Observer's visual capability.
- Flight Observers must use caution to ensure the UA remains within normal line-of-sight.
- The use of UAS Staff and the use of lighting and/or IR beacons to identify the launch/recover areas is highly recommended.

Deconfliction of Aircraft within Operational Air Space

All UAS flights shall be grounded upon arrival of approved manned aircraft entering the operational air space.

Deconfliction shall be initiated by the Lead PIC of the aircraft.

Incident Commanders shall not approve UAS flights to resume until the Lead PIC of the aircraft designates UAS operating areas and approves UAS use during manned flight operations.

It is the responsibility of the UAS pilot and Flight Observer to confirm and maintain awareness of all manned aircraft activity during UAS operations.

In the event a non-Department UAS is identified in our operational air space (incursion), the Lead PIC shall notify the Incident Commander and follow the "incursion protocol" found in the Department UAS Operations Manual.

Security Policy

Chain of Custody for Retained Material

1. All recorded photo/video material related to a Department emergent response shall be archived and cataloged immediately after the conclusion of the incident; then surrender any recorded photo/video material to the Section Commander, Arson/Counter Terrorism Section, the Department's official custodian of records.
2. All recorded photo/video material **not** related to a Department response; i.e. planned training event, *shall be surrendered to the In-Service Training Section by permission* of the custodian of records (Section Commander, Arson/Counter Terrorism Section).
3. All recorded photo/video material **not** related to a Department response; i.e. planned Department training events, involving Department personnel *and/or on Department property* shall be used, edited, reviewed and approved for internal dissemination within 60 days.
4. All recorded photo/video material **not** related to a Department response; i.e. planned Department training events, public relations events or involving non-Department personnel, in public space or in and around public property or domains shall be edited/produced, reviewed and approved by Community Liaison Office.

Records Retention

The Department strives to gain, develop and maintain the trust of the public it serves. The Department's primary intention for integrating UAS technology into its initial action hazard mitigation and response matrix is to increase the incident commanders' "situational awareness." Situational awareness is the ability to fully understand the challenges of a given incident in "real time," thereby providing critical information necessary to guide decision-making. Ultimately, those decisions impact the amount of risk he/she is willing to assume with firefighters' lives.

In most cases, "real time" information will be captured solely to transmit "live" footage to a Department Incident commander or command post. Although there may be occasional benefits to sharing, recording and retaining visual data, this is **NOT** the intended purpose when a UAS is launched in public space or in and around public property or domains.

The Department or any entity associated with the Department UAS Program will not engage in the indiscriminate, unobscured publication of footage depicting non-Department personnel. Visual data shall never be displayed on the Department's public facing website or social media portals when not in the best interest of the public. It is the intent of the Department by policy and practice, to protect the privacy interests of members of the public or other "non-Department personnel."

The Department or any entity associated with the Department UAS Program will not permit any retained visual data to be merged with other surveillance databases, or retained solely for the purpose of mining the data at a later time by the Department or other agencies.

It will be the Department's policy and practice to record visual data of the emergent incident only where there is a specific, identified Department need. Although this is not an exhaustive list, such needs would include footage that captured an unusual occurrence; occurrence of serious building compromise or collapse; roof compromise or collapse; large area involvement with fire (conflagration, flashover, backdraft or explosion); injury or death to a firefighter or member of the public; or in connection with anticipated or pending litigation or compelling public interest.

It will be the Department's policy and practice to retain visual footage after the conclusion of the emergent incident if that footage captured an unusual occurrence, such as: occurrence of serious building compromise or collapse, roof compromise or collapse, large area involvement with fire (conflagration, flashover, backdraft or explosion), injury or death to a firefighter or member of the public, or in connection with anticipated or pending litigation or compelling public interest.

The decision to record and subsequently retain any visual data captured in public space or in and around public property or domains will be balanced against the competing but equally important public concern for transparency. The retention of any visual footage or audio file will be in accordance with the Los Angeles Administrative Code, Division 12, Chapter 1, Section 12.3, 12.4, and 12.5.

Records Sharing

Visual information will be captured to transmit "live" footage to a Department Incident commander or command post. Viewing such live footage may occur during exigent circumstances where an incident demands or impacts the resources or responsibilities of other entities such as law enforcement, public agencies, utility providers or political bodies. During these "Unified Command" scenarios, non- LAFD personnel may have **visual** access to images captured by a LAFD UAS **but only** for the purpose of providing critical information in "real time" necessary to guide decision-making and increasing "situational awareness."

The Department or any entity associated with the Department's UAS Program will not engage in the indiscriminate sharing or unwarranted surrendering of footage depicting non-Department personnel. Moreover, the Department will not freely surrender any footage captured via a UAS to any other governmental or non-governmental agency except in special circumstances, such as where doing so: Is necessary to carry out a fire, rescue, disaster, or other LAFD mission; is for the purposes of a mutual-aid mission; is required under any laws governing the disclosure of government records; or is required pursuant to a duly issued court order.

It is the intent of the Department by policy and practice, to protect the privacy interests of members of the public or other "non-Department personnel."

Program Oversight

The Board of Fire Commissioners (the Board)

As the Department's civilian oversight body, the Board shall have the authority and responsibility of oversight of the Department UAS Program, its adherence to established policy and its overall efficacy. This oversight will include review of quarterly reports on UAS flights, mission objectives, any photographic or video images retained and a program benefits analysis.

As the Department UAS Program grows and evolves, there may be a need to add, delete or modify not only the specific uses and deployment scenarios but the written policy and guidelines. In the event substantive changes in the Department's use of UAV's, or the collection, retention, or access to such information occur, the Fire Chief will request review and approval of said changes by the Board and City Council's Public Safety Committee.

Independent Assessor

The Board's independent assessor or other named designee will serve the role, if so directed by the Board, of reviewing the Department's use of UAS including whether the original rationale for deployment is met, whether the Department is complying with its stated policies and approved purposes, and whether the UAS program represents a worthwhile public expenditure. The subsequent report will be provided to the Board quarterly.

Program Authorizers

A three-person panel, who report to the Emergency Operations Chief Deputy, made up of the UAS Program Coordinator and the Battalion Chiefs assigned to Air Operations and In-Service Training Section.

Authorizer 1: Department UAS Program Coordinator - Responsible for maintaining the compliance, performance and adherence to policy of the UAS Program. Responsible for all UAS equipment inventory, expenditures, maintenance and related reports.

Authorizer 2: Air Operations Battalion Chief – Responsible for ensuring proper maintenance of flight records, flight logs, training hours and licenses to meet FAA regulations for UAS pilots and observers. Responsible for ensuring UAS pilots and observers remain current on FAA rules and have a thorough working knowledge of Department Air Operations.

Authorizer 3: In Service Training Section Battalion Chief – Responsible for coordinating the development and delivery of training and training materials related to the Department UAS program. Also responsible for receiving, verifying and maintaining all prerequisite training, training records and related documentation for members entering into the Department UAS program.

Program Instructors - Department UAS Program Instructors will be Department members who have, at a minimum, maintained a Part 107 license, has completed an FAA recognized training course for "ground school" and flight operations, has a minimum of 25 hours of logged UAS flight in a quadcopter, hexicopter or higher or has equivalent flight, flight crew or flight observer training.

Appendix

DEFINITIONS:

Data Technician: The person assigned to the Command Post to provide “real time” photo/video or other information, obtained from UAS mounted “sensors” to the Incident Commander (this role can be filled by the EIT/Captain I Adjutant).

Ground Control Station (GCS): Is a component of the Unmanned Aircraft System (UAS). Consists of the operator control unit (OCU), ground data terminal (GDT) and associated cables and antennas. This GCS provides the interface between the Pilot in Command (PIC) and the unmanned aircraft (UA).

Ground Data Terminal (GDT): Is a component of the Unmanned Aircraft System (UAS). Contains all the necessary equipment for the communication links between the UA and the operator control unit (OCU) for both data and video. Also contains a Global Positioning System (GPS) to enable the operator to determine the system’s location.

Liaison: A person who interacts with incident personnel to avoid distracting the PIC and observer from their duties.

National Airspace (NAS): The National Airspace System is the network of the United States airspace, air navigation facilities, services, airports, regulations, procedures, technical information, manpower, and material shared jointly between the Federal Aviation Administration (FAA) and the military.

- Airspace is classified based on the activities therein which must be confined because of their nature.
- There are 4 types of airspace that fall under 2 Categories.

Observer: The observer is responsible for visual observation and safety of the unmanned aircraft (UA) while in flight.

Operator Control Unit (OCU): Is a component of the Unmanned Aircraft System (UAS). Consists of the control transmitter or computer that is used to make changes to the aircraft position and altitude and the data/video transmitted by the UA.

Payload: The amount of equipment carried by the aircraft. Typically divided between command and control communications (radio receiver antenna) and video (camera, transmitter).

Person Manipulating the Controls: A person other than the remote pilot in command (PIC) who is controlling the flight of an UAS under the supervision of the remote PIC.

Pilot-In-Command (PIC): The person directly responsible for all operations including safety of the UA as described by Federal Aviation Regulations (FARS) 91.3.

Remote Controller: The wireless communication device that provides the interface between the operator and the UAS.

Remote Pilot in Command (Remote PIC or Remote Pilot): A person who holds a remote pilot certificate with a sUAS rating and has the final authority and responsibility for the operation and safety of a sUAS operation conducted under part 107.

Small Unmanned Aircraft (sUA): A UA weighing .5 pounds or more but less than 55 pounds, including everything that is onboard or otherwise attached to the aircraft, and can be flown without the possibility of direct human intervention from within or on the aircraft.

Small Unmanned Aircraft System (sUAS): A small UA and its associated elements (including communication links and the components that control the small UA) that are required for the safe and efficient operation of the small UA in the NAS.

Sensors: High Resolution (zoom capable) cameras, Infrared/Thermal Sensors, Night Vision Image sensors, Gas/Chemical Sensors (Sniffers) - Not all use scenarios will use photo or video cameras

Unmanned Aircraft (UA): An aircraft operated without the possibility of direct human intervention from within or on the aircraft.

UAS: An Unmanned Aerial System also known as a drone

Video Camera Remote Controller: The person in control of the second or auxiliary remote control. Controls only the gimbal/sensor portion of the UAS. Needs constant communication with PIC for safe operation. (See night operations.)

Visual Observer (VO): A person acting as a flight crew member who assists the small UA remote PIC and the person manipulating the controls to see and avoid other air traffic or objects aloft or on the ground.